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(54) Laminate insulating material

(57) A method of manufacture of insulating material comprises the steps of locating a sheet of permeable material (3) upon a laminar substrate (2), applying prepolymer (12) to the sheet, allowing the prepolymer to foam (8) and to permeate the sheet, causing the foam to cure and adhere to the said substrate.

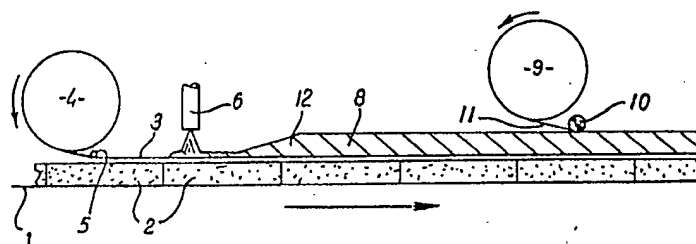


FIG. 1

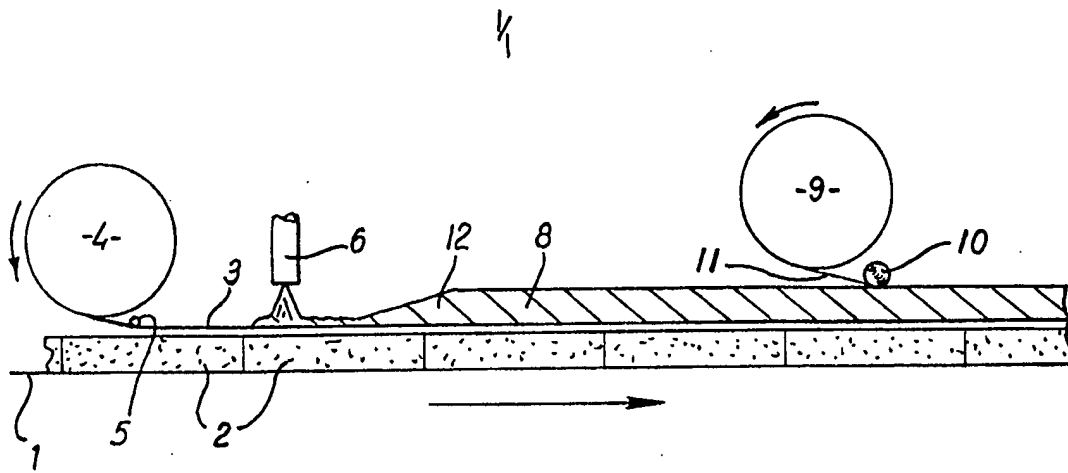


FIG. 1

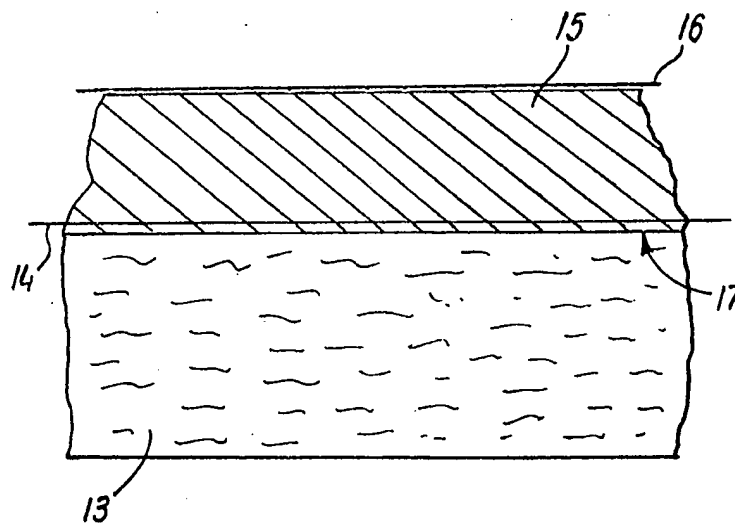


FIG. 2

SPECIFICATION

Laminate insulating material

5 This invention relates to insulating material of the kind comprising a laminate of a layer of foamed polymer applied to a layer of substrate. Laminates incorporating porous or otherwise absorbent substrates such as cork are used for insulation of

10 buildings and other structures.

Insulating materials have been made by spraying a prepolymer mixture onto a cork substrate and allowing the mixture to foam and harden. A considerable proportion of foaming mixture penetrates

15 into the pores and interstices of the cork. The layer of cork is often composed of abutting blocks and the foaming mixture has been found to penetrate between the blocks causing them to separate.

According to a first aspect of the present invention

20 a method of manufacture of insulating material comprises the steps of locating a sheet of permeable material upon a laminar substrate, applying prepolymer to the sheet, allowing the prepolymer to foam and to permeate the sheet,

25 causing the foam to cure and adhere to the said substrate.

According to a second aspect of the present invention an insulating material comprises a sheet of permeable material located on or adjacent a laminar substrate, a layer of foamed polymer being

30 disposed upon said sheet, permeating the sheet and adhering to the substrate. Foaming of the prepolymer may cause the sheet to be slightly displaced from the substrate.

35 The sheet may be composed of any convenient permeable material, for example glass tissue, polyester or other woven or non-woven fabrics.

The sheet is preferably permeable to such an extent that sufficient of the foaming prepolymer can

40 pass through it into contact with the substrate to cause the cured foam to adhere to the substrate. Passage of a great quantity of prepolymer through the sheet is not preferred because this is uneconomical.

45 Use of the method of this invention allows foaming prepolymer to be applied to extremely porous substrates such as cork as well as to plywood, chipboard, plasterboard, metal, plastics sheets, concrete or other cementitious materials. Any alternative rigid or flexible substrate may be employed. Use of the invention in conjunction with

50 blocks is facilitated in that insufficient foaming prepolymer may pass through the sheets to cause separation of the blocks.

55 A covering sheet may be applied to the foaming prepolymer. Suitable covering sheets are preferably flexible and may be composed of bitumen, paper, metal foil, glass tissue, polyester fleece or

60 other materials.

Both the permeable sheet and covering sheet may be tensioned during foaming to maintain planarity of the product. Laying of foam onto a non-tensioned surface such as a cork substrate

65 tends to produce

method in accordance with this invention affords the additional advantage that a planar product is easily obtained. It should be noted that use of a highly permeable sheet through which the prepolymer may pass easily, may result in the sheet not being located upon or closely adjacent the substrate. This makes it difficult to control the planarity by tensioning the sheet. Tensioning of the permeable and cover sheets may be achieved by tensioning supply rolls from which they are delivered.

70 The foamed polymer may comprise polyurethane, polyisocyanurate, phenolic resin or any other convenient compound. The prepolymer may be applied to the sheet by spraying, liquid deposition or other means known to those skilled in the art.

The permeable and covering sheets may be wider than the finished laminate to provide a support for the edges of the latter, thereby minimising waste. The edges of the laminate may be trimmed in accordance with established practice.

The invention is further described by means of example and not in any limitative sense with reference to the accompanying drawings, of which:-

75 *Figure 1* illustrates the method in accordance with this invention; and

Figure 2 illustrates an insulating material manufactured in accordance with the method.

80 *Figure 1* shows a schematic view of apparatus for performance of a method in accordance with this invention.

A moving conveyor 1, which may be an endless belt, sheet of paper drawn over a polished surface or a similar conveying apparatus, carries a plurality of abutting blocks of a substrate 2. The substrate may be cork, chipboard, plywood, cementitious material, metal, plasterboard, or plastics blocks. A sheet of permeable glass tissue 3 is located upon

100 the substrate 2 from a supply roll 4. The tension of the sheet 3 is controlled by a tensioning roller 5. Liquid polyurethane, polyisocyanurate or phenolic resin prepolymer is sprayed onto the sheet 3 from a nozzle 6. The prepolymer is spread evenly across the sheet by means appropriate to the process. Foaming of the prepolymer causes a layer 8 of polymer to be formed on the surface of the sheet 3. A small proportion of the prepolymer permeates the sheet 3 and comes into contact with the underlying

105 substrate. Foaming may cause the prepolymer to raise the sheet slightly from the substrate to a location adjacent the latter. Curing of the foamed prepolymer 8 causes the latter to adhere to the substrate 2. A covering sheet 11 may be applied to the surface of the foaming prepolymer prior to passage of the product under a calender roll 10 and subsequent curing.

The tension maintained in the sheets 3, 11 enables the dimensions of the foaming layer to be controlled, particularly to prevent curling of the resultant laminate. In an alternative method a batchwise process may be employed.

120 *Figure 2* illustrates a fragment of an insulating material in accordance with the invention. The cork substrate 12 is secured to the body of foamed polymer 13.

polymer w15 at the interface 17 by a small proportion of polymer which was allowed to permeate the glass tissue sheet 14. The sheet 14 may be located in contact with the substrate 13 or may be displaced slightly from it by the polymer which has permeated through the sheet.

A covering layer 16 e.g. of bitumen, is disposed on the top surface of the laminate.

The permeable sheet 14 enhances the flexural strength of the laminate.

CLAIMS

1. A method of manufacture of insulating material comprising the steps of: locating a sheet of permeable material upon a laminar substrate, applying a prepolymer to the sheet, allowing the prepolymer to foam and to permeate the sheet, causing the foam to cure and adhere to said substrate.

2. A method as claimed in claim 1, including the step of applying a covering sheet to the foaming prepolymer.

3. A method as claimed in claim 1 or 2, including the step of tensioning either the sheet of permeable material or covering sheet or both.

4. A method as claimed in any of the preceding claims wherein the permeable sheet is wider than the finished insulating material.

5. A method as claimed in any of claims 2 to 4, wherein the covering sheet is wider than the finished insulating material.

6. A method of manufacturing insulating material substantially as hereinbefore described with reference to the accompanying drawings.

7. An insulating material comprising a sheet of permeable material located on or adjacent a laminar substrate, a layer of foamed polymer being disposed upon said sheet permeating the sheet and adhering to the substrate.

8. An insulating material as claimed in claim 7, wherein the permeable material comprises glass tissue, woven or non-woven fabric.

9. An insulating material as claimed in claim 7 or 8, wherein the insulating material comprises cork, chipboard, plywood, plasterboard, metal or cementitious material.

10. An insulating material as claimed in any of claims 7 to 9, including a covering sheet upon the layer of foamed polymer material.

11. An insulating material as claimed in claim 10, wherein the covering material comprises bitumen, paper, metal foil, glass tissue or polyester fleece.

12. An insulating material substantially as hereinbefore described with reference to the accompanying drawings.